

**CLAIMS**

What is claimed is:

1. A method of propagating a previous position to a current position in a vehicle navigation system, said method including the steps of:
  - 5 a) providing longitudinal acceleration information;
  - b) providing vertical acceleration information;
  - c) determining a pitch of the vehicle from said vertical acceleration information and said longitudinal acceleration information; and
  - d) using said pitch to propagate a previous position to a current position.
- 10 2. The method of Claim 1 further including the step of determining a change in said pitch from said vertical acceleration information and said longitudinal acceleration information.
- 15 3. The method of Claim 2 wherein said step c) is performed without information from a rotation sensor.

4. A method of propagating a previous position to a current position in a vehicle navigation system, said method including the steps of:

- a) providing longitudinal acceleration information and vertical acceleration information;
- 5      b) providing heading information; and
- c) determining roll of the vehicle based upon said vertical acceleration information, said longitudinal acceleration information and said heading information.

10      5. The method of Claim 4 further including the step of using said heading to propagate a previous position to a current position.

6. The method of Claim 5 further including the step of using said heading to propagate a previous position to a current position

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7. The method of Claim 4 further including the step of obtaining said heading information from map-matching.

8. The method of Claim 4 further including the step of obtaining said heading  
20      information from GPS velocity information.

9. The method of Claim 4 wherein said step c) is performed without information from a gyro.

10. A method of propagating a previous position to a current position in a vehicle navigation system, said method including the steps of:

- a) providing longitudinal acceleration information and vertical acceleration information;
- 5       b) providing speed information; and
- c) determining pitch based upon said vertical acceleration information, said longitudinal acceleration information and said speed information

11. The method of Claim 10 further including the step of using said pitch to  
10       propagate a previous position to a current position.

12. The method of Claim 11 further including the step of obtaining said speed information from GPS velocity information.

13. A method for propagating a previous position to a current position in a vehicle navigation system, said method including the steps of:

- a) receiving a plurality of signals from an inertial sensor mounted in a vehicle;
- b) determining a pitch of the vehicle based upon the plurality of signals; and
- 5 c) propagating a previous position to a current position based upon the plurality of signals and said pitch as determined in said step b).

14. The method of Claim 13 wherein said steps a) and b) are performed while the vehicle is moving.

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15. The method of Claim 13 further including the steps of:

- e) determining whether the vehicle is not moving; and
- f) performing said steps a) and b) based upon said step e) when said vehicle is not moving.

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16. The method of Claim 13 further including the steps of:

- d) monitoring the plurality of signals to determine a low noise situation; and
- e) performing said step b) based upon said step d).